

The Mining Journal

LONDON, DECEMBER 28, 1956

Vol. 247. No. 6332

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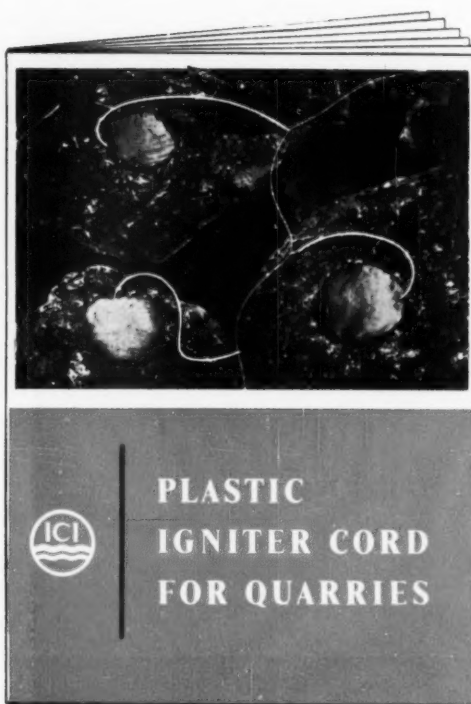
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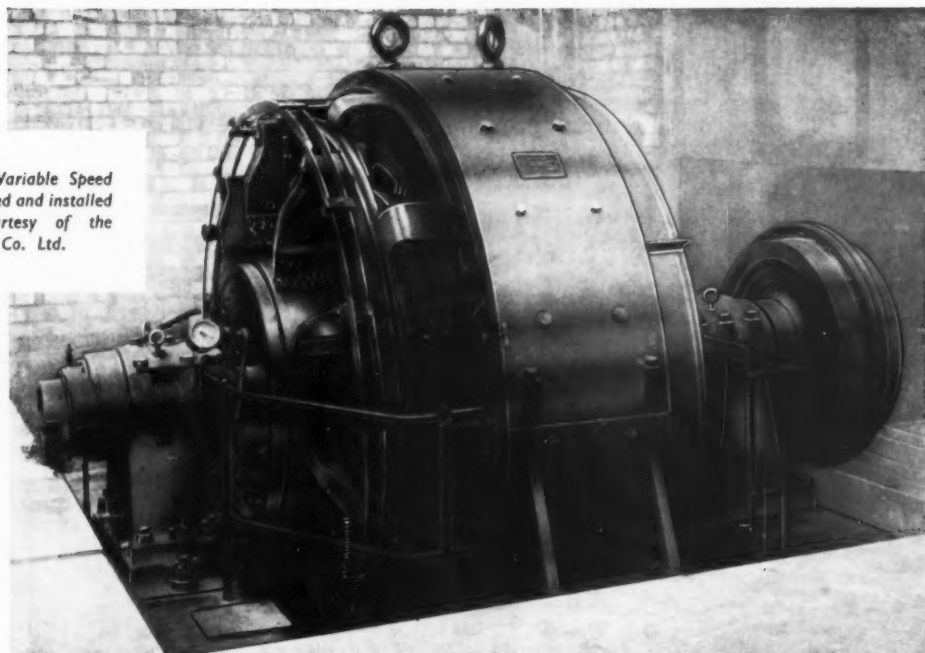


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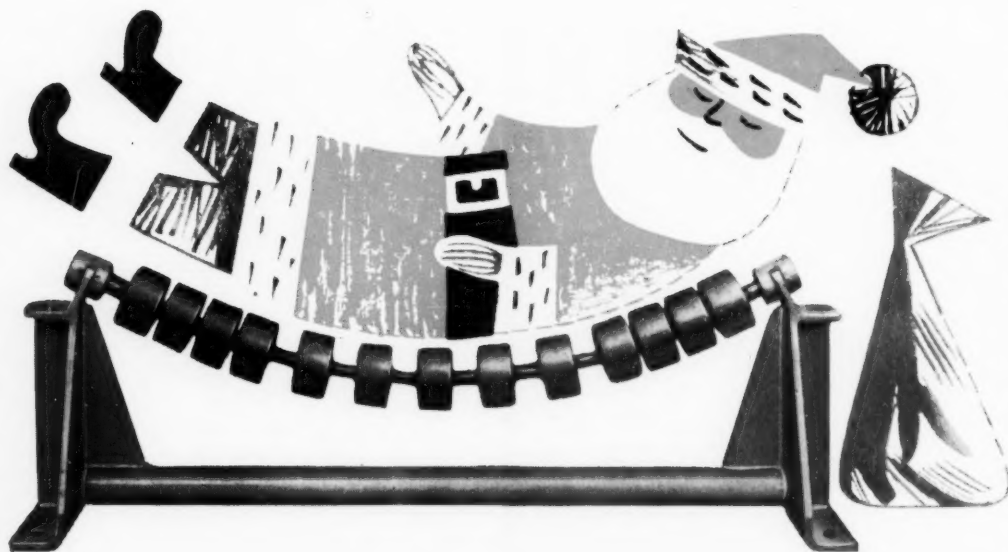
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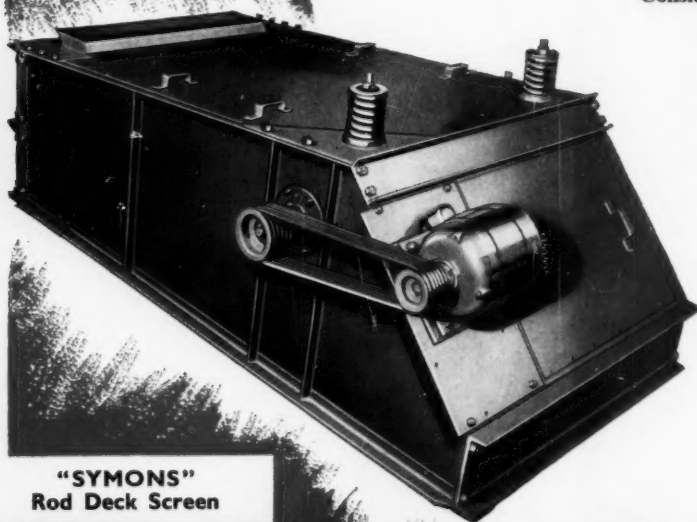
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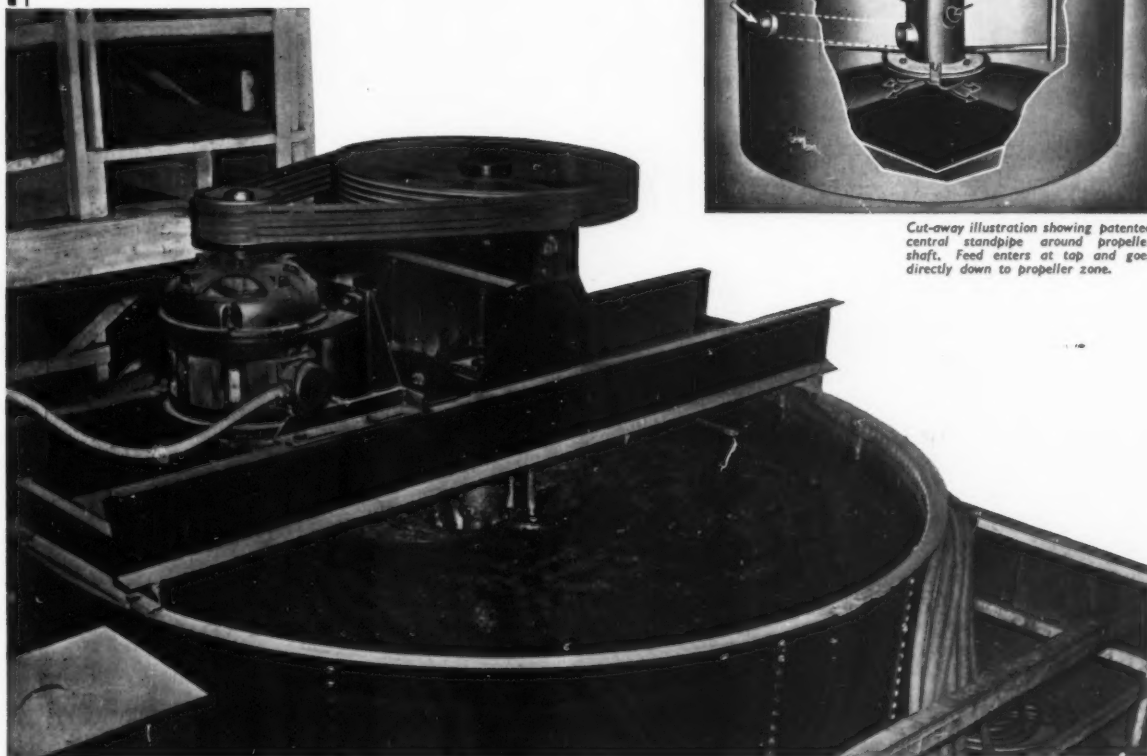
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The Mining Journal

London, December 28, 1956

In this issue . . .

Mining Still Booming	789
Why Pay Dollars For Metals?	792
Advances in Russian Coal Mining Technique	794
Gold in Industry	796
Mining Miscellany	798
Technical Briefs	800
Metals and Minerals	801
Mining Finance	803
Company Meetings and Announcements	804
Professional Directory	805

Vol. 247

No. 6332

Established 1835

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Published each Friday by

THE MINING JOURNAL LTD.

Directors

E. Baliol Scott U. Baliol Scott
(Chairman) (Managing)

G. A. Baliol Scott R. A. Ellefsen

15, WILSON STREET,
LONDON, E.C.2.

Telegraphic

Tutwork London

Telephone

MONarch 2567 (3 lines)

Annual Subscription £2 5s. Single copy ninepence

Mining Still Booming

DEPENDING on the outlook and temperament of the viewer, 1956 will be regarded as another difficult and painful stage in the long period of travail preceding the birth of a more stable, prosperous, and one hopes, contented world; or it will be looked back upon with sorrow and apprehension for the shattering of the improved international relationships which were slowly being established and the reversal to the law of a jungle armed with the tooth of the guided missile and the claw of the hydrogen bomb.

The brief *toenadering* (as the Afrikaners expressively term "getting together") with Russia, has been effectively ended by the rape of Hungary, which heralded the end of "de-Stalinization", with all its apparent implications.

Is this abrupt transformation in Soviet policy symptomatic of a regime that is cracking at the foundations, or is it the prelude to a hotting-up of the cold war with the Middle East as one of the prime objectives of Russian aggression? It is possible that this most vital of all political questions may be answered during the coming year.

Regrettably, 1956 has also witnessed the further growth of irresponsible Egyptian nationalism, as personified by the egregious Nasser, which culminated in the seizure of the Suez Canal, the invasion of Sinai by Israel, the intervention of Britain and France, and the blockage of the Canal with the consequent disruption of international communications and oil supplies. It has yet to be seen whether the outcome of these events will be the apotheosis of the United Nations and the emergence of a more stable Middle East, or whether the flames of the imperfectly extinguished fire in this area are destined to spread further still.

Among other highlights of a more than usually eventful year may be noted Eisenhower's personal success in being re-elected President of the United States in the teeth of Democratic gains in Congress; the opening of Britain's and the world's first commercial nuclear power plant at Calder Hall; the continuation of deadlock and terrorism in Cyprus; the promise of self-government for the Gold Coast and Malaya; the nationalization of the Kolar goldfield by India, and the encouraging reception accorded by the British Parliament and most Commonwealth countries to the proposed association of the United Kingdom with the European free trade plan.

The world's well-nigh insatiable appetite for minerals and metals led during 1956 to a further upsurge in mine production throughout the greater part of the Free World. If credence can be attached to official announcements by Communist governments, the tempo of expansion is scarcely less rapid on the far side of the Iron Curtain.

Particularly spectacular have been the achievements of the Canadian mining industry, which continues to leave all previous annual records far behind. It is anticipated that this year the value of Canada's mine output will be little short of \$1,700,000,000; if petroleum and natural gas are included the total value will exceed \$2,000,000,000. Last year it was \$1,800,000,000 and in 1954 a little less than \$1,500,000,000.

In Australia, too, considerable expansion has taken place in most departments of the mining industry, though it seems to be unlikely that mine production of lead during 1956 will differ very greatly from that of the previous year. Australia is already reaping the benefits of the incentives provided by tax concessions, which find their most spectacular expression in the mining developments associated with the Northern Territory.

Among the highlights of Australia's mining year might be singled out the rutile boom, which threatens to outstrip the rapidly rising world demand, and the discovery of extensive bauxite deposits in the Cape York Peninsula.

By the end of November Southern Rhodesia's mineral output had already exceeded the £20,500,000 record set up last year and it was expected to reach about £23,000,000 by the year-end. Minerals valued at over £70,000,000 were produced in Northern Rhodesia during the first half of 1956—i.e. £20,000,000 more than in the first six months of last year. Having regard to the lower prices of copper now prevailing some reduction in the aggregate value of the copper output must be anticipated during the coming year. The concentrating plant at Chibuluma—the first new mine to go into production in the Copperbelt since before the second world war—was officially opened early in May, while Bancroft is scheduled to enter the list of producers early next year.

The start of operations at Kariba was an outstanding event in the history of the young Central African Federation. The main engineering contracts associated with this ambitious project were awarded to Italian interests, but in mitigation of this disappointment nearly all contracts for the supply of materials and machinery for the transmission and generation of electrical power went to British firms. The past year has also been notable for the broadening interests of the Copperbelt companies, whose participation in the economic development of the Central African Federation is being extended far beyond the mining field.

In an otherwise highly satisfactory year for the Federation, a jarring note was struck by the growing unrest among African mineworkers, which was reflected by a succession of labour troubles on Copperbelt mines. These troubles stem directly from the Federation government's liberal approach to the problems of a multi-racial society. They might be described as growing pains associated with the initial stages of African advancement, and can be expected to disappear as the African slowly takes his place with greater assurance and an increased acceptance of responsibility in industry.

The latest available figures show that during the first eleven months of 1955 the monthly average of gold produced in South Africa was 14,108,000 f.oz. compared with 13,375,000 oz. during the corresponding period of last year. Production from the older mines of the Central and Far East Rand is falling, but is being replaced by increasing output from the newer mines in the Far West Rand, Klerksdorp and Orange Free State fields, which give a higher average yield. Forecasts for the next three or four years indicate a slight decline in total tonnage milled, which is likely to be more than offset by a further increase in the average total yield. Production of uranium has also increased sharply in recent months, the value of exports rising by about 60 per cent.

Much progress is also reported in the development of France's mineral resources overseas. The French government is to ask Parliament to set up a central body to co-ordinate the French Sahara, covering 1,400,000 sq. miles, which is believed to be potentially one of the richest mining territories in the French Union.

In Asia one of 1956's most notable developments, from a mining and metals standpoint, is India's latest Five-Year

Plan, in which the emphasis is on the expansion of heavy industry based on the expansion of mining production. Doubts have been expressed as to India's ability to carry through this ambitious programme without excessive dislocation of the country's economy, but whatever the strain on India's financial resources, it is evident that future expansion depends primarily on the extent to which the development of the Dominion's mineral resources can be speeded up.

China is on the verge of an immense upsurge of industrial expansion in which, once again, the development of this country's immense natural resources will play a dominating rôle.

Having regard to the irresponsible outlook now deplorably prevalent in some parts of the world towards the legitimate interests of foreign investors, the assurance that Malaya welcomes overseas capital and will provide adequate safeguards for investment is to be warmly welcomed. There are still large areas in Malaya which have yet to be prospected and the possibility of substantial additions to the Federation's declining tin reserves can by no means be excluded.

In the U.K., as in other countries both east and west of Suez, 1956 ends with petrol rationing, fluctuations in commodity prices, and critical exchange problems consequential upon the emergency in the Middle East. Whatever the rights and wrongs of the Anglo-French action in Egypt, it can scarcely be disputed that the root cause of Britain's political and economic difficulties is too low a rate of capital investment, which in turn stems from excessive taxation and a level of production which is not rising as it should.

One of the most deplorable consequences of the failure of successive British governments to provide any encouragement for the investment of risk capital is the frustration experienced by U.K. mining companies, which is aggravated by the lack of any conscious national policy on mineral resources. The implications of this situation are discussed elsewhere on page 792.

No less paradoxical is the position regarding the export drive—more vital than ever to our economy as a result of the Suez crisis—in which manufacturers of mining machinery and equipment are participating on a significant and growing scale. This, on the one hand, is being fostered by the credit squeeze and on the other is being frustrated by taxation policy and the absence of incentives in the form of tax relief.

At a time when the immediate outlook for metal producers has been adversely affected by temporary depressants, such as the boiling over of the American motor car industry, the effects of the credit squeeze in the U.K. and uncertainties regarding stockpiling policy, a robust confidence that the need for basic raw materials will continue to rise with population and living standards is indicated by the effort currently being devoted by the steel and aluminium industries to the search for raw materials.

The aluminium industry in the U.S. ends 1956 in a state of approximate equilibrium between supply and demand, thanks to the completion of various large projects for the extension of production facilities. In this market alone, however, demand is expected to exceed 3,000,000 tons by 1958 and 5,000,000 tons by 1975 and for North American producers the sky still remains the limit. This situation is reflected by the vastness of the bauxite operations in Surinam and Jamaica, the exploitation of Haiti's bauxite resources, and the proposed creation of a bauxite and alumina exporting industry in French Guinea. In the Gold Coast the Volta River Project has been brought into the realms of practical politics by publication of the Preparatory Commission's report.

For producers of uranium and thorium the year 1956 has been a memorable one. In Britain—acknowledged leader in the development of nuclear power generation—the opening of the world's first commercial nuclear power station, Calder Hall—had been followed by the first three full-scale commercial nuclear power station contracts to be awarded in the world. Negotiations for a fourth power station are currently taking place. Across the Atlantic, privately-owned and publicly-owned utilities in the U.S. have so far announced plans to build 16 atomic power plants at an estimated cost of \$425,000,000 to produce more than 1,000,000 kW. of electricity. These plants are scheduled to start generating power between 1959 and 1962.

While the precise nature and quantities of the fuels likely to be used for nuclear power generation must still be a matter for conjecture—much of the uncertainty formerly clouding the uranium industry has been dispelled by these and many other reassuring indications that commercial exploitation of atomic energy has finally arrived and that expansion of this new industry is likely to be considerably more rapid than seemed probable as recently as twelve months ago. Having regard to the rate at which the world's power requirements are expanding, producers of both uranium and thorium can look forward with considerable confidence to a prosperous future.

The year has also brought a welcome lifting of the veil of secrecy which Free World governments have imposed on uranium resources and production. It has been revealed that the U.S. alone is producing uranium ore at a current rate of nearly 3,000,000 s.tons and that the total Free World output is expected to exceed 30,000 tons of U₃O₈ annually upon completion of the projects now under way. Canada's known reserves of uranium ore are officially placed at 225,000,000 tons and by December 31, 1957, will be producing at the rate of 3,300 tons a year of U₃O₈. In South Africa there are now 29 mines officially scheduled for uranium production. It appears that all these companies, should they choose, will now be legally able to release details of uranium ore reserves, the uranium grade involved, and the tonnages likely to be handled.

Progress in the nuclear field is having a far-reaching impact on the mining and metal industries by providing a new and growing market for materials such as zirconium and beryllium, which in some instances are available as by-products of mining operations for other metals. The supply-demand picture for a number of metals is also being influenced to an ever-increasing extent by the need for materials capable of withstanding the progressively higher temperatures encountered in gas turbines and in the field of supersonic flight, where the heat barrier is the next major obstacle to be overcome.

Despite expanding output industrial users in the U.S. and Western Europe are hampered by the continued shortage of nickel and very high prices continue to be paid on the free market. That this situation is likely to be prolonged is indicated by the recent invitation from the O.D.M. in Washington to companies both inside and outside the States to plan for new and expanded nickel facilities. Inco has announced plans for the development of a \$175,000,000 nickel project in the Mystery-Moak Lakes area in Northern Manitoba, which will be the second largest nickel mine in the world. As a result of this new project, and taking into consideration increasing production from Cuba and other sources, it is estimated that by 1960 world nickel production will be in the region of 300,000 s.tons annually.

So far as the L.M.E. metals are concerned, the salient feature of 1956 was the behaviour of copper, which started

the year on a note of scarcity and rising prices reaching the all-time peak of £429 at the end of March, but thereafter nosediving steeply, under the combined influence of rising production and reduced demand, to finish the year in the region of £275. This temporary setback need occasion no lack of confidence in the long-term future for this oldest of industrial materials, which remains extremely bright. Thus a recent forecast by Sir Ronald Prain puts the addition to world copper supplies during the years 1956-57 at 268,000 tons a year, giving a projected world output of 3,869,000 tons in 1960 and of 4,089,000 tons in 1961. The bulk of this increase will come from Africa and Central and South America.

After years of travail—dating back as far as 1948 when a working party was set up to draft a tin agreement—the International Tin Council started operations during the current year. The Council estimates that there will be a small production deficit in 1956 and a small surplus in 1957, when the Texas smelter will no longer be in operation. With tin at its present price it is hardly surprising that all contributions so far made to financing the buffer stock should have been in cash, or that the Council should be faced with demands from some producer members for a revision of the floor and ceiling prices.

For gold producers 1956, generally speaking, has been another year of frustration and disappointment. Once again the South African Minister of Finance returned empty-handed from Washington, having failed—like his predecessors—to persuade the International Monetary Fund that a rise in the price of gold, besides benefiting producers, would be a timely step towards the re-establishment of the world economy on sounder and more stable lines. There are nevertheless some grounds for encouragement in the fact that the narrowing gap between Uncle Sam's gold stock and his own short-term liabilities to foreigners is at last beginning to attract attention within the U.S.

The diamond industry, on the other hand, has had an excellent year with the demand for both gems and industrial diamonds exceeding supply. Producers see no cause for anxiety either in the production of small artificial diamonds by G.E.C. or in the very large deposit reported to have been discovered in the U.S.S.R.

This chronicle of world-wide expanding production has been accompanied by a further intensification of prospecting and exploration activities throughout the globe. The use of aeroplanes and helicopters has led to a phenomenal speed-up in prospecting activities, besides overcoming the difficulties formerly associated with wild and inaccessible terrain, while developments in the fields of geophysics and geochemistry have provided the prospector with new and highly efficient tools.

The search for new deposits covers virtually the whole of the African, American and Australian continents, as well as much of Europe and Asia. It has even spread to Eire (where Canadian interests are re-investigating and re-opening abandoned mining properties with astonishingly fruitful results) and into the virgin hinterland of Liberia, where deposits of rich iron ores have been discovered and an American company is searching for titanium-bearing ores.

Parallel with the expansion of prospecting and exploration are advances in metallurgical techniques, which are enabling minerals to be economically extracted from complex and low-grade ores.

All in all, 1956 has been another boom year for the mining industry, and even if the immediate future appears a little less ebullient, the vast future expansion of this industry of ours remains as certain as anything can be in this imperfect world.

ALMOST exactly a year ago Viscount Bruce of Melbourne made a plea in the Lords for a bold and imaginative scheme for the development of the British Commonwealth's mineral resources. The government promised that the proposal would receive careful examination.

To-day—fully twelve months later—we are still no further on. Meanwhile more valuable mineral resources have been lost to the Commonwealth, through the Trinidad Oil deal and other similar but less publicized transactions, which are the inevitable consequences of unsound principles of taxation and the absence of a planned minerals policy, the need for which has once again been emphasized by the consequences of the Suez emergency. Not only is such a policy needed to prevent control of Commonwealth deposits from passing into other hands, but also as a means of conserving gold and dollars which we can ill-afford to waste.

This month Parliament's attention has again been directed to various aspects of minerals development. Ex-

Britain from seawater during the war, but this was discontinued owing to the high cost of electric power. The tonnage currently imported into the U.K. in 1955 was only 4,885 tons, of which Canada supplied 3,095 tons, so that the present cost in dollars is not very great. It can scarcely be doubted, however, that magnesium consumption will expand very rapidly in future years and eventually this metal, too, will constitute a formidable drain on dollar resources unless other sources of supply can be developed. Here, too, there appears to be a strong case for encouraging either production within the U.K. or the establishment of plants for extracting magnesium from seawater in countries such as British Guiana, where the potential hydro-electric resources are very great.

It is possible that the exchange position in regard to nickel may in time be considerably alleviated by exploitation of a recently discovered deposit in the Gatooma area of Southern Rhodesia, which is claimed to be extremely extensive. There are also large undeveloped deposits of sulphide nickeliferous ores in South Africa. Again, the U.S. is by far the world's largest source of molybdenite, but this mineral is of fairly widespread occurrence and the existence of payable deposits in Commonwealth countries can by no means be excluded.

Generally it seems most probable that modern methods

Why Pay Dollars

ploitation of the indigenous resources of non-ferrous metals in the U.K. was urged by Earl Jowitt in the Lords last week, while the establishment of a new corporation to absorb the existing Colonial Development Corporation was proposed by Sir Albert Braithwaite in the Commons earlier in the month.

Non-ferrous metals rank third in the cost of British imports. No less than £230,000,000 was spent in 1955 in importing non-ferrous metals alone; in addition, scrap cost Britain about another £30,000,000. Most of our non-ferrous metal imports, as well as the 12,896,500 tons of iron ore imported last year are from sources within the sterling area, but by far the greater part of our aluminium and nickel requirements are paid for in dollars; a similar position exists in regard to magnesium and molybdenum, and to certain other metals in varying degree. To what extent could dollars be conserved by developing or expanding the production of these materials in Commonwealth territories?

Potential Dollar Savers

In the Commons debate Sir Albert Braithwaite pointed out that last year we spent £30,000,000 in dollars on bringing aluminium to the U.K. The great Volta River scheme, however, one of the most important projects currently under consideration anywhere in the world, is situated within the sterling area. The production of aluminium at Volta from domestic bauxite resources would materially strengthen the economy of the U.K. and of the sterling area as a whole. The Preparatory Commission regards this project as potentially economic, but even if this view proved to be over-optimistic, some form of subsidisation might prove to be well justified by the large saving in dollars which would result quite aside from the opportunity thereby afforded for the general economic development of the area.

Magnesium, to take another case, was produced in

For Metals?

of exploration would lead to the discovery of many valuable and dollar-saving deposits in the vast areas of the Commonwealth which are still entirely unprospected.

Last year Britain imported 11,600,000 tons of coal, of which 5,500,000 tons came from the U.S. The total cost of the American coal was between £35,000,000 and £40,000,000. About 75 per cent of the freight cost was in sterling, the net dollar cost to the U.K. being in the region of £25,000,000. Yet there are virtually unlimited quantities of coal of good coking quality in Tanganyika, where the Colonial Development Corporation has spent £600,000 in improving coal mining. Reserves already proved are placed at between 300,000,000 and 500,000,000 tons. Now that coal has to be brought to Newcastle, why should we not plan to ship it from East African ports (the Suez canal permitting!) so that dollars can be conserved?

Need For a Minerals Audit

Such questions—typical of many others which must arise—cannot be answered without studying the Commonwealth's requirements as a whole. What is needed is a Commonwealth minerals audit, to provide a detailed blueprint on which a co-ordinated approach by all Commonwealth governments to the problems of minerals development can be based. In the words of Mr. Bernard Braine, a Paley Report for the Commonwealth is required. It would be interesting to know whether this problem is engaging the attention of the Commonwealth Economic Committee.

Apart from the savings in hard currency which could result from more intensive development of the Commonwealth's mineral potential, it may well be that Britain

could further strengthen her economic position by exploiting her own natural resources of non-ferrous metals, as advocated by Earl Jowitt in the Lords' debate.

Despite the formation of U.K.M.M.A. some three years ago to champion the domestic metalliferous mining industry, no major extension of mining or prospecting activities has occurred in recent years; such operations as are at present in progress being small. Two tin mines are operating in Cornwall, both of which are doing well; a few small lead mines are active, and some exploration is in progress here and there. But all these operations, added together, amount to very little indeed. Moreover, at the Geological Survey's present rate of progress, it will unfortunately be a great many years before Britain has been fully surveyed. Undiscovered sources of non-ferrous metals and other materials may well exist, particularly in the wilder and more mountainous areas, in regions which have never been prospected at all.

What Is Potential Saving?

In the absence of a comprehensive mineral survey, it is not possible to assert the potentialities of Britain's metalliferous mining industry with any degree of confidence. Roughly speaking, outputs of tin, lead and zinc in the U.K. last year, compared with the best year in the decade before World War II, were respectively for tin 1,037 l.tons compared with 3,250 in 1929, lead, 7,413 against 54,000 in 1934 and zinc 1,048 against 11,000 in 1938. At present prices the output for 1955 had a value of approximately £1,801,000 compared with £7,750,000 on the basis of what were admittedly exceptionally good pre-war years. The disparity between these figures is sufficiently striking, even against the background of a total U.K. consumption of these metals last year worth around £76,651,500 at current prices.

It is evident from these figures that quite a substantial reduction in the cost of importing non-ferrous metals could result from any significant increase in output from indigenous resources. In order to create a favourable climate for the expansion of the domestic mining industry, the first requisite is obviously the prospect of relatively stable metal prices.

Replying in the Lords' debate Lord Mancroft pointed out that Britain's national prosperity depended greatly on the efficiency of engineering production. He therefore considered it would be foolish to base our non-ferrous policy, with which it is closely linked, on any other principle than that of obtaining these metals, whether at home or abroad, where they could be produced more cheaply and efficiently than anywhere else.

There is no reason, however, why the expansion of domestic mining in the U.K. should not be achieved without detriment to the competitive position of engineering exports, by subsidizing in a suitable manner the production of non-ferrous metals. The U.S. government has found it expedient to encourage mineral producers—domestic and foreign—by purchasing large tonnages of critical metals over long periods at special prices. The results of this policy have exceeded the most optimistic expectations.

One of the arguments advanced in the Lords for encouraging the expansion of metalliferous mining in the U.K. is the need for a few good metal mines which could serve as a training ground for mining engineers. This point was made by Viscount Falmouth, who recalled the old days when the majority of mining engineers came from Cornwall and used to encourage mines overseas to send back large orders for machines to be manufactured in Britain. British mining engineers are becoming less common overseas and mining in the under-developed areas is to an increasing extent being undertaken by Canadians and

Americans. If we are going to keep up the export of mining machinery, we must have some sources in this country where machines can be tried and developed.

Tax Relief Vital

Of critical importance not only to the expansion of metalliferous mining in the U.K. but also in the wider context of British participation and leadership in the development of the Commonwealth's mineral resources, are preferential tax concessions designed to encourage enterprise and risk capital. Some three or four years ago the Cornish Mining Association addressed a questionnaire to four of the great British mining houses, asking why they were showing so little interest in mineral development in Britain. In every case the answer, with emphasis, was taxation.

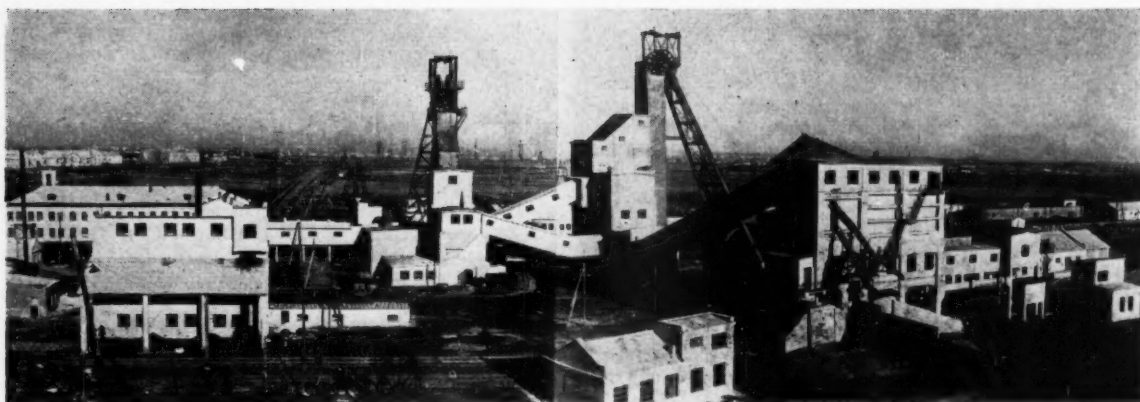
The Example of Eire—

Earl Jowitt, quoting from *The Mining Journal*, instanced the benefits which have accrued to Eire as an example of what can be achieved by generous tax concessions. Earlier this year Eire introduced a Bill under which new mining operations are free of tax for four years and pay only half-tax for four years thereafter. In consequence of this concession, six Canadian groups are now operating in Eire, several of which have subsidiary companies at work. One company alone has spent over £500,000 on operations at a single mine and estimates that it will require to spend a further £1,750,000 during the next year or so to bring the mine into production.

—Canada and Australia

The Canadian government is purchasing all the uranium which is won at such a generous price that the producing companies are able to amortize all their costs in five years. In Australia uranium mining and gold mining are encouraged by a scheme whereby no tax at all is exacted for five years. A plea for more lenient tax treatment for the British mining industry operating overseas was made a few days ago by Mr. S. E. Taylor, president of the Overseas Mining Association. In this connection it will be recalled that earlier this year the Chancellor said he would give careful consideration before the 1957 Finance Bill to those recommendations of the Royal Commission on the Taxation of Profits and Income, which referred to the possibility of creating a new category of companies under the style of "overseas trade corporations". Such companies would be liable for U.K. taxation only in respect of distributed profits. The Chancellor also promised the introduction of legislation next year to deal with the situation arising from the frustration by the U.K. tax system of pioneering industries' reliefs which are granted by overseas authorities.

The Chancellor considers that the bigger question of "overseas trade corporations" would settle the smaller one of the frustration of "pioneer industries reliefs". The British Overseas Mining Association does not accept this view but advocates that reciprocal "pioneer industries' reliefs" should be granted to all companies eligible for them. We feel that BOMA is correct in this view. If British capital and know-how are to be effectively mobilized in the development of the Commonwealth's mineral resources, half measures in tax matters are useless in the face of the kind and extent of the reliefs being granted to mining in other parts of the world.



The Ganzovka mine, a new colliery in the Donets Basin, has recently begun operations. It is regarded as typical of the coal mines of the region.

ALL the coal basins of the U.S.S.R. were already technically re-equipped in the first five years after the war.

The KMP-1 and KMP-2 coal-cutting machines ousted the less productive GTK-3 model, while oscillating conveyors were everywhere replaced by the more reliable and more efficient scraper conveyors, and the light electric mine locomotives gave way to new and heavier types. The trolleys were also modernized and standardized.

Improvements were introduced in ventilators, pumps, winches, hoisting and other mine equipment, with the result

at the longwalls and the loading of coal and rock in the process of tunnelling.

Before and during the war Soviet inventors and designers had been working on the construction of a longwall combine. Many models were tested before the problem was solved in 1949 by the Donbas combine. This combine has a capacity of from 3 to 4½ feet. It performs all the main processes: coal

Advances in Russian Coal

that coal cutting, hauling, transport and loading were completely mechanized. Coal output rose rapidly, increasing to 261,000,000 tons in 1950, as against 164,000,000 tons in 1946.

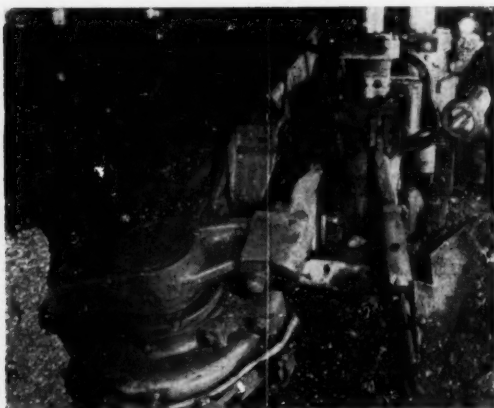
In the second post-war Five-Year Plan (1951-55) the main stress was laid on the mechanization of arduous mining processes still performed by hand. Mention should be made in the first place of the shovelling of coal on to the conveyor

cutting, breaking and loading on flat beds.

Much was done to promote the use of the Donbas combine in the years that followed. By the end of 1950, more than 300 were in use, and by the end of 1955 that number had increased to 900. Furthermore, the addition of some extra appliances has made it possible to use the combine on beds ranging from 3 ft. to 8 ft. 2½ inches.

Later Gornyak, Shakhtyor, UKT-2 and UKMG-2 combines were built for use on thin flat faces, ranging in capacity from 1½ to 3 ft. Altogether, about 1,500 coal combines of various types are being used at the present time in the mines of the U.S.S.R. Their use made it possible to mechanize last year

A new coal combine, the K-26, is shown at left in a drift of the Zapadnaya pit of the Rostov Coal Trust, while at right is seen a set of roof trusses and jacks of new design installed in Rostov's No. 14 pit.



The following article, condensed from "Soviet News," gives some indication of the developments in the Russian coal mining industry since the second world war.

the loading of about one-third of all the coal mined on flat faces; that is, more than 70,000,000 tons.

Scoop loaders are used in the main for coal and rock loading in the pits. About 3,000 such machines are being used in the mines at present. Approximately half of all the tunnelling is done with their aid. A new step in the mechanization of this work was taken in 1953-55, when the Moscow, Donets and Kuznetsk coalfields received tunnelling combines.

Tunnelling combines are most widely used in the Moscow Basin, owing to the softness of the coal there. About 100 PK-2M combines in use there last year made it possible to clear 164,000 yards of workings in one year. The combines in use at the Donbas have been designed for breaking harder coal and rock.

Experience has shown that the use of combines increases the rate of tunnelling by an average of 200-300 per cent and in some cases, by as much as 700-900 per cent. For example, at the Baidayevskaya Mine, in three months (February to April) of this year, it has been possible, with a Gumennik combine, to clear 3,280 yards of workings — an average of nearly 1,100 yards a month — whereas no more than 110-132

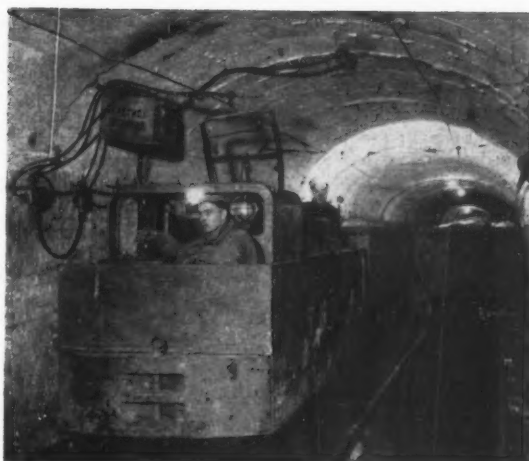
Mining Technique

yards a month can be cleared with the use of loading machines. The number of tunnelling combines will be brought up to between 1,500 and 2,000 in the near future.

Of considerable interest is the hydraulic method of coal mining. With this method the coal is broken from the face by means of water jets directed at the seam under high pressure from a hydromonitor. The water, together with the coal, streams into collectors from which it is raised to the surface by special pumps.

Two "hydro-mines" have been operating in the Kuznetsk Basin for some years now. A special plan has been drawn up for extending this method of coal mining to all the main basins. Experience has shown that hydraulic coal mining raises the efficiency of the mines by 100-200 per cent., lowering the cost of coal mining correspondingly. And so water, the traditional enemy of the miner, has now become his ally. Another advanced method elaborated in the Soviet Union is the underground gasification of coal.

Transport in the mines is still in some cases a bottleneck, since its handling capacity lags behind the coal production. This problem is expected to be solved by substituting belt conveyors for electric and cable roads in some of the mines and substantially improving the efficiency of electric locomotives in others. The U.S.S.R. is expected to bring up its coal output in 1960 to 592,000,000 tons.



Above: Fourteen-ton electric locomotive in the Dobropolye mine No. 3.

Centre: A new metal portable shield, model SHCH-52, is 50 metres in length and is designed to mechanize propping.

Below: Measuring table machinery in the Donbas.

ALTHOUGH gold is one of the most adaptable metals, the extent to which it can be used as an industrial material is limited by its relatively high cost. Had gold not been regarded from time immemorial as a precious metal, it would find hundreds of important applications in modern industry, but, on the other hand, it is improbable that the price would have been sufficient to cover the cost of its recovery from low-grade ores. Since the price of gold—which for several years has been arbitrarily prevented from rising—is hardly likely to go down, there is no way of overcoming the economic limitations currently restricting industrial usage unless processing costs can be reduced.

Gold

Of considerable interest, therefore, to producers and users of the precious metal is the news that an entirely new and economical heat treatment method of applying 22 ct. gold coatings on ceramics, porcelain enamel and stainless steel has been developed by an American firm, Hanovia Chemical and Manufacturing Company, after 15 years of intensive research. Exhaustive tests have shown that the new method, which can cover an area of between

in

50 and 60 sq. ft. with 22 ct. gold at a cost of \$17, can be used for store fronts, lettering on porcelain enamel, trade marks and emblems on home appliances, architectural finishes, and for many other decorative purposes. It is claimed that the process will put products with a genuine gold finish within reach of the "middle income" consumer, and that the original brilliant gold lustre can be retained indefinitely.

Industry

Softer than silver but harder than pure tin, gold is the most malleable and the most ductile of all metals. Leaf gold can be made only one three hundred-thousandth of an inch thick by hammering, and an ounce of gold can be drawn out into 50 miles of wire. The tenacity of gold is seven tons per square inch, or less than that of silver or copper. A gold wire of 0.1 in. in diameter is broken by a weight of 123 lb. Gold has an elongation of 30.8 per cent before rupture.

The density of cast gold is about 19.3, which can be raised by rolling to 19.48 and by hammering to 19.65. The density of precipitated gold is slightly higher. The metal melts at 1,064 deg. C. and volatilisation begins at about the same temperature. Its boiling point has been estimated to be about 2,530 deg. C. under atmospheric pressure.

At ordinary temperatures the electrical conductivity of gold is 76.7, that of silver being 100. Its conductivity for heat is also less than that of silver and copper, and it is non-magnetic.

No metal is more imperishable than pure gold, which is unaffected by any salt or acid, suffers no diminution or

loss by melting, and neither rusts nor tarnishes.

One of the chief chemical characteristics of gold is the difficulty with which its compounds are formed and the ease with which they are decomposed. Perfectly pure gold is seldom used for manufacturing purposes both on account of the long and expensive chemical refining processes required, which would add considerably to costs, and because it is too soft for most industrial purposes. The fine gold of commerce consists of about 25½ to 23¾ cts., whereas the finest gold entirely free from any alloy is 24 cts.

Fine gold spreads under the hammer more than any other metal, and can be worked into almost any form or design. It has been stated that one ounce of gold beaten into leaves would cover 10 acres of ground. For manufacturing purposes, however, the extreme limit to which fine gold is nowadays reduced is seldom more than a thinness equivalent to 100 sq. ft. to the oz., which is sometimes attained by gold-beaters.

The metal used for this purpose is usually in the vicinity of 23 cts., the variations in colour being obtained by alloys with silver and copper in different proportions.

No less remarkable is the ductility of gold. Wire-drawers have been known to obtain a thread 230,800 ft. long from a single ounce of gold. Wire-drawing to extremely fine limits used to be a particular speciality in India, where gold wire considerably thinner than the finest London or Birmingham work has been produced. In Britain the extreme limit of ductility is never reached, there being no commercial demand for wire finer than that required for the manufacture of filigree or gold lace.

Commercial Usage

Various qualities of gold are in regular commercial use. Gold coins, when introduced into English currency by Henry III, were of 24 cts. Since the reign of Queen Elizabeth I the standard has almost invariably been 22 cts., a quality which has been used extensively in the manufacture of rings. British watch-cases are occasionally made of 22-ct. gold. Twenty-ct. gold has been a legal standard in Ireland since 1784, but is seldom used by jewellery manufacturers in England except by workers in coloured gold who require colours or shades for decorative work which cannot be produced in inferior gold.

Eighteen-ct. gold, which is the second English standard, is widely used in the production of high-class jewellery. Owing to the peculiar nature of its alloy, this gold can be employed for almost any purpose.

Yellow gold, red gold, green gold, blue gold and white gold are the principal variations in colour used in the manufacture of ornamental jewellery. Red and white are mineral, gaseous or liquid inclusions, and are usually employed for flowers—green for the leaves and yellow or fine gold for the stems or sprays.

Fifteen-ct. gold is an alloy frequently used for coloured jewellery, for the production of which it is ideally suited. Thirteen-ct. gold has also been used very extensively for coloured jewellery. Nine-ct. gold is regularly employed in the manufacture of many kinds of articles, such as solid gold chains or fancy rings. Eight-ct. gold is also used and, if properly alloyed, works extremely well in any process of preparation. Seven-ct. gold, which is about the lowest quality used, requires particular care on account of its large silver content, which increases the fusibility of the alloy.

It is some 60 years since coloured gold was introduced into the British market for commercial purposes. Nowadays there are various processes of dry-colouring, wet-

colouring and finishing, by which the surface of alloyed gold can be transformed to give all the appearance of fine gold itself. These processes are by no means merely a gilding of the surface with gold of higher quality, but actually refine the entire surface by removing base or inferior metal, leaving gold of a deep rich colour which is almost identical to that of fine gold itself.

Colloidal gold suspended in water may be obtained by precipitating dilute solutions of gold chloride. Such gold was first prepared by Faraday, and the ruby-coloured liquids containing it are known as "Faraday's gold". The gold is in the form of minute particles, which are too small to settle in water under the influence of gravity, so that the liquids remain unchanged even if left undisturbed for years. The gold purples, such as the well-known "Purple of Cassius," also derive their colour from finely divided metallic gold or a "colloidal solution" of gold.

Gold Alloys

Gold and silver unite in all proportions when melted together, forming homogenous alloys. The colour of gold becomes paler when small quantities of silver are added to it, and with 50 per cent of silver become white, with a scarcely perceptible tinge of yellow. Alloys containing more than 60 per cent of silver are silver-white. Gold with small quantities of silver, ranging from 10 to 20 per cent, is sometimes described as "green gold". All gold and silver alloys are soft, malleable and ductile, being intermediate in these properties between pure gold and pure silver. Alloys of gold and silver have been used from early times in jewellery and for coins. The addition of copper to harden both gold and electrum was made in Roman coins before the Christian era.

Copper hardens gold and increases its malleability, at the same time giving it a redder colour. The gold-copper alloys are used extensively for coinage and jewellery, for which purposes pure gold and the gold-silver alloys are too soft.

Alloys of gold and zinc containing less than 14 per cent of zinc are pale yellow and of about the same hardness as gold but increase gradually in brittleness with an increased percentage of zinc. The first additions of zinc rapidly reduce the melting point and result in a long, pasty stage during solidification, so that gold containing 1 or 2 per cent of zinc can readily be welded. As the zinc is increased from 14 to 25 per cent, the colour of the alloy changes gradually from pale yellow to a beautiful reddish-lilac tint and the melting point rises to a maximum of about 750 deg.

Alloys containing between 15 and 20 per cent of iron are used in jewellery in France under the name of *or gris*. They are greyish-yellow, very hard, and easily worked. *Or bleu* is gold alloyed with 25 per cent of iron.

A number of age-hardenable gold alloys have been developed, which possess greater strength and resistance to wear than those of the carat type. Among these are gold-platinum-copper-silver combinations, the gold-platinum alloys, and an important group which contains gold, palladium and silver, with the addition of small amounts of cobalt, nickel, zinc, tin or copper. Green, blue and purple alloys are obtained by the addition of cadmium, iron and aluminium respectively.

Before the invention of electroplating, which came into use about 1840, the usual method of gilding metals was to apply gold amalgam to the surface with a brush dipped in a solution of nitrate of mercury. The amalgamated article was then rinsed and dried and the mercury was expelled by evaporation over a charcoal fire. Afterwards the article was scratch-brushed and burnished, or

coloured or treated by one of the ormolu processes. Nowadays, articles are electrogilt or electroplated by making them the cathode in a bath of potassium auricyanide with gold as the anode. Such plated gold will take a high polish, has high electrical conductivity, and is not liable to tarnish.

A more recent method of surface coating articles with gold is that known as cathode sputtering or cathode dispersion, in which the articles are placed in a vacuum in the path of gold particles discharged on passing a high current from a gold cathode to an aluminium anode. Thin gold films may also be deposited on glass or metal by heating gold electrically in a high vacuum and allowing the gold vapour to settle upon articles placed in the vacuum chamber.

In the production of gold leaf the metal is cast into flat ingots, weighing 2 oz. each, and these are rolled out, with frequent annealings, until about 0.0013 in. thick. The riband of gold is then cut into inch-square pieces, a packet of which, interleaved with vellum, is beaten with a 16 lb. hammer until each gold leaf is 4 in. square. They are again cut into inch-square pieces and beaten between gold-beaters' skins with a 10 lb. hammer until about 3½ in. square, when they are put up in small books between paper leaves, each book of 25 leaves containing from 4 to 10 grains of gold. Gold leaf can be applied to many surfaces, including wood, leather, metal, paper, glass and stone.

Rolled gold, one of the principal forms in which the metal is used industrially, is made by soldering or welding a plate of gold to one or more sides of a base block about 6 in. square and from 1 in. to 1½ in. thick, the whole being then rolled out to the required thickness. Seamless gold-plated tubes and wires can also be produced by this method.

Miscellaneous Uses

"Potter's liquid gold," a clear brown varnish consisting of a solution of complex organic compounds of gold in essential oils, etc., is brushed on pottery and afterwards fired. Liquid burnish golds are also used in ceramic decoration, and consist of a suspension of gold powder, the colour being varied by the addition of silver. "Purple of Cassius" is used in stained glass, enamels, china and porcelain.

In dentistry gold is used as fillings, in dentures and in orthodontic wires. Platinum-gold and palladium gold alloys are sometimes employed in dentistry.

Gold-lined plant is used in the distillation of certain essential oils, for containing liquors concerned in the wet viscous process of artificial silk manufacture, and in gold-platinum alloys as spinnerets. In chemical plants and laboratories, a high gold-palladium alloy with a melting point of 1,370 deg. C. is sometimes used as a substitute for platinum when the price of the latter metal is high.

As the pure metal or alloyed with palladium, gold may be used in thermo-couples, as a fuse in electric furnaces, and in electric contacts. Among other miscellaneous applications the metal and its alloys are used in the hair-springs of chronometers, in the suspension wires of galvanometers, in coating base metal conductors carrying high-frequency radio currents, in the plating of mirrors in infra-red drying apparatus, in X-ray work and radium therapy, and in the manufacture of special spectacles for iritis.

Despite the relatively high price of the metal, the quantity of gold used in industry, and the number of different applications, are greater than they have ever been before.

MINING MISCELLANY

The Cummins Engine Co., Inc., of Columbus, Ohio, will set up a plant for the manufacture of its diesel engines at Shottis, Lanarkshire, Scotland, under the name of Cummins Engine Co. Ltd.

A Swedish consultant has approved a scheme of the Pakistan Industrial Development Corporation to set up a steel plant at Multan. The project has now to be approved by the Pakistan Government.

The production of brown coal in Denmark in 1956 was expected to reach about 2,200,000 tons, compared with 1,500,000 tons in 1955. Production from two new workings in Jutland are largely responsible for the increase.

A 4,500 h.p. diesel electric dredger built for the Surinam Bauxite Co. was recently launched at Kinderdijk. It will be used for removing non-ore bearing layers in Surinam bauxite mining operations.

Coal exports from the Cauca Valley in Colombia are to start in 1957 at an estimated rate of 2,000 tons per day. The price will be \$15 U.S. per ton. South America and some European countries will be the main buyers.

Professor Budryk, rector of the Mining and Metallurgical Academy in Cracow, recently gave a press interview on plans for extracting an estimated 93,000,000 tons of coal from under towns and industrial plants in the Upper Silesian basin. It is calculated that a total of 2,100,000,000 tons of coal lie beneath towns in the area and research on methods of safe extraction has been proceeding for some years at the Mining and Metallurgical Academy.

Krupps has announced the sale of 55 per cent of the shares of its coal mine "Constantine the Great" to the steel works Bochumer Verein at an unspecified price. The deal was transacted in compliance with the agreement with the Allies under which Krupps is to sell its coal and steel assets by March, 1958. The output of the mine is about 3,000,000 tons a year.

The Government of Mexico recently published a decree authorizing a subsidy to iron and steel producers in order to encourage production, which still shows an annual shortfall of 400,000 tons against requirements. To help producers expand their operations and at the same time encourage the installation of new plants, the authorities are authorizing a subsidy of 75 per cent of import taxes and federal participation in mercantile taxes.

A report in a Haiti newspaper from a source which has not been identified states that recent studies of bauxite deposits on the island indicate that mining of the ore may develop into an industry with an output worth \$125,000,000 a year. Haiti bauxite has hitherto been classed as "marginal", but it was indicated that extensive

studies of the ore deposits might result in altering processing concepts. The newspaper also quoted officials of Reynolds Metals as stating that the company had asked the territory to auction off the mineral rights to extensive areas of certain public lands. Kaiser Aluminium has also been studying bauxite resources in Haiti.

Mass production of a dust-eliminating suction device for pneumatic drills used in mining will be started next year in Czechoslovakia. Developed by the Scientific Coal Research Institute in Ostrava-Radvanice, the equipment consists of two types: a special pneumatic drill with a central suction system, or a suction head which can be attached to the ordinary pneumatic drill now used throughout the Czechoslovakian mining industry. Both operate by sucking the dust from the hole drilled into a 66 lb. dust separator which captures 92-96 per cent of all dust particles, including the very dangerous stone particles less than five microns in diameter.

British dumpers have won praise in Ontario's uranium mining industry and are now in extensive service on projects in the Blind River area. During the past twelve months, the Chasewood Engineering Co. Ltd., of Hertford, has sold 35 dumpers worth about \$175,000 in this market. Mr. G. L. G. Jackson, general manager of the company, considers that there are great prospects for this equipment in the Canadian mining industry. His company is "going all out" in the development of dumpers and has formed an associate company at Toronto with show rooms, offices and workshops, where a special study of the requirements of the industry has been made.

Director Liu Yee, chief of the Ministry of Geology executive, is reported to have stated that new discoveries of coal and expansion of existing facilities should raise production in China to 113,000,000 tons annually by next year. This compares with a coal output of 80,000,000 tons in 1955. New methods for probing deep seams have been used. Recent surveys also reveal that China's iron reserves amount to 3,100,000,000 tons, which is sufficient to meet anticipated industrial demands for the next 60 years.

Senor J. Sareaza, president of the Bolivian Mining Development Bank and Sr. H. Antezarna, Deputy Minister for the Mining Industry, have arrived in Tokyo to hold a series of discussions with the Japanese government and industrial leaders. A Foreign Ministry spokesman said the Bolivian mission was scheduled to inspect Japanese mining areas and discuss the possibility of joint Bolivian/Japanese co-operation in developing the Bolivian mining industry. It is understood that under Japanese/Bolivian trade arrangements exchange of technicians would also be discussed during the missions' visit.

As part of the Gas Council's five-

year programme of exploration for supplies of natural gas in Britain, the Scottish Gas Board proposes to carry out a prolonged test of the natural gas resources existing at Cousland, near Edinburgh, to establish whether supplies of town gas to consumers could be augmented from this source on a commercial basis. The presence of natural gas at Cousland was proved by an exploration well drilled by the BP Exploration Co. before the war, but the exact size of the reservoir has not yet been established with accuracy.

The Japan Coal Federation, composed of the 18 foremost mining companies, has issued a "white paper" on the state of the industry and the difficulties facing it. The report which, like the white paper of the National Railways Corporation, seems designed to prepare the way for an increase in prices, stated that little had been achieved in the year since the Government passed a law for promoting rationalisation in the coal industry, and admitted that productivity was still low and production costs high. This was attributed to the lack of a consistent government policy on fuels, high taxes, inadequate investment funds, and the unhelpful attitude of the labour unions.

A method of chemical prospecting developed by Soviet Academicians Vernadsky and Vinogradov is being applied in the Soviet Union, according to the Industrial and Economic Gazette. A soil and plant analysis is carried out before drilling starts to determine the distribution of deposits. It was ascertained, for example, that while under normal conditions the nickel content of grass amounted to 0.001 per cent, grass growing over nickel deposits in the Southern Urals had a nickel content of 0.06 per cent. Similarly vetches found in the Karadjian district of Armenia had a molybdenum content of 0.05 per cent in certain locations where deposits of molybdenite were later found. Similar methods of soil and plant analysis have, of course, been developed in Free World countries and are now being extensively applied.

A report describing the international classification system of hard coals by type and the statistical grouping of hard coals, has been released by the Secretariat of the United Nations Economic Commission for Europe (E.C.E.). The system was worked out by the Coal Classification Working Party of E.C.E. to meet the needs of producers, traders and users of coal for a common language. Copies of the report are obtainable from the Sales Section, European Office of the United Nations, Geneva, or may be ordered through sales agents for United Nations Publications. The price is \$0.50, 3s. 6d. sterling, Swiss francs 2, or the equivalent in local currencies.

The Bethlehem Steel Company has completed the sinking of vertical shafts at its Grace Mine near Morgantown, a few miles from Reading, Pa. There are two

shafts, one about 2,200 ft. deep and another about 3,000 ft. deep. Three horizontal tunnels are under construction at depths of about 1,800, 1,900 and 2,000 ft. A pelletizing plant is also under construction. A unique feature of the operation is the use of 20-ton capacity cars, built specially for underground work. About 19 of these cars have been completed. It is expected that production will be started some time in 1958. The ore will be shipped to Bethlehem, Pa.

At a special meeting, stockholders of Cerro de Pasco have authorised the company to sell and convey substantially all of the Peruvian assets and certain current assets of the Corporation to a new wholly-owned subsidiary to be organized under the laws of Delaware. The Corporation owns mines, concentrating plants, smelters and refineries and other facilities in Peru, producing principally zinc, lead, copper, silver, bismuth, and other non-ferrous metals. Mr. Robert P. Koenig, president, explained that the action was designed primarily to preserve the Western Hemisphere Trade Corporation tax status in respect to earnings derived from operations in Peru. He noted that corporations that qualified for such status paid U.S. income taxes at the rate of 38 per cent instead of the usual corporate rate of 52 per cent.

The Economic and Industrial Gazette, the journal of the technical committee of the Soviet Council of Ministers, in a leader "on the necessity of criticism in the Soviet press," states that during the last six months three letters had been critical of the Soviet Ministry of Non-Ferrous Metals in general and its head, Minister Lomako, in particular. While a reply had been received that the criticism would be considered, nothing whatsoever had been done. Three months after the publication of the letters, *The Gazette* published an article on the low productivity, the obsolete equipment and the poor organization of the Soviet non-ferrous metal industry, the leader adds. But again there was no reaction or action from Minister Lomako. The authorities should bear in mind that criticism in the Soviet press must be noted and acted upon in order to achieve a proper use of the country's resources, the article declared.

The Department of Chemistry, Sir John Cass College, Jewry Street, Aldgate, London, E.C.3, announces three interesting courses to be held during the second term of the 1956-57 Session. The first course, devoted to Microchemical Analysis, is by A. G. Lidstone, M.A. (Cantab.), B.Sc. (Lond.), and David W. Wilson, M.Sc. (Belfast), F.R.I.C. and will consist of about ten lecture-demonstrations suitable for analysts and advanced students of chemistry. It is designed to introduce the principles and techniques of inorganic and organic analysis on the micro and semi-micro scales. The course is to be held on Thursday evenings at 6 p.m., beginning on Thursday, January 10, 1957. Two courses in Practical Spectroscopy by L. O. Freeman, M.Sc., Ph.D., and D. B. Powell, B.Sc., A.R.I.C. are also announced for Friday evenings, one in the second and one in the third term of the Session. Emission Spectroscopy will last 10 weeks from Friday, January 18, to March 22, 1957, lectures from 6 p.m. to 9 p.m., and Absorption Spectroscopy will last 10 weeks from Friday,

May 3 to July 5, 1957, lectures being from 6 p.m. to 9 p.m. Fee for each course for those residing in the Administrative County of London is £1.

Successful laboratory tests by the U.S. Bureau of Mines, which may lead to development of an economical method for recovering both mercury and antimony from ores of the Kuskokwim River area in Alaska, are described in a report released recently by the Bureau. When mercury and antimony occur together, the antimony not only interferes with recovery of the mercury by standard methods but is itself lost. Metallurgists at the Bureau's Juneau, Alaska Experiment Station made preliminary tests of several techniques and selected two regarded as most promising. Samples of cinnabar-stibnite from the Red Devil mine near Sleightmute, Alaska, were used. A plant at this mine recovers only mercury from ore typical of those in the Kuskokwim area, which has large potential reserves of mercury and antimony.

Edibrac Ltd., manufacturers of "Edibrac" hard metal carbide and "Centurion" cutting tools, rock and coal drill bits and picks, etc., announce the opening of their new Mining Division works at Romiley, Cheshire. Previously this division had been located at Broadheath, where the administrative offices remain, but the steadily growing demand for the company's drilling bits and chain cutter picks for mechanized coal getting made an expansion in production facilities essential. The transfer of the mining division to Romiley will allow the cutting tool division to occupy the whole of the Broadheath Works, thus doubling its capacity.

PERSONAL

Mr. J. B. Davis has been appointed an additional manager of the Consolidated Gold Fields of South Africa and New Consolidated Goldfields.

As indicated in the chairman's statement to shareholders at the annual meeting on September 19, Sir Herbert Merrett has resigned his position as chairman and director of Powell Duffryn Ltd. with effect from December 31. From the same date he is also resigning from the boards of the main subsidiary and associated companies of Powell Duffryn. Sir Henry Wilson Smith, at present deputy chairman, has been appointed chairman of Powell Duffryn Ltd. with effect from January 1.

Mr. Roy S. Fenton, who joined Chase-side Engineering Co. Ltd. early in 1956 as assistant to the general manager, has been appointed home sales manager to direct the activities of the Home Sales Division throughout the U.K.

Mr. S. Webb, technical director of Oldham and Son (Africa) Ltd. and Mr. K. McDonald, the chief chemist, arrived recently at London Airport on a flying visit to the parent firm, Oldham and Son, Ltd., of Denton, Manchester.

L'Industrie du Diamant en 1955, by A. Moyer, 54 Rue Royale, Brussels, presents a comprehensive review of the diamond industry last year, covering production

throughout the world, the diamond trade, the diamond cutting industry, and developments in the marketing and utilization of industrials.

The U.K. Atomic Energy Authority has set up a commercial department within its industrial group to handle sales of uranium, plutonium, thorium, graphite and other similar materials for the authority. Within the general policies laid down by the Authority, this department will be responsible for negotiating terms and conditions of sale, including the determination of selling prices. The manager of this department is Mr. W. P. Warren, whose address is:—U.K. Atomic Energy Authority, Industrial group Headquarters, Risley, near Warrington, Lancs.

British European Airways now has helicopters available for special charter work, including two Sikorsky S55, one Bristol 171, and a Bell 47. Information and rates are obtainable from the B.E.A. Space Control Section, Dorland Hall, Lower Regent Street, London, S.W.1.

Seventeen papers will be submitted by the British National Committee at the Yugoslav Sectional Meeting of the World Power Conference, which will be held in Belgrade in June, 1957. The dates announced are June 5-10, but it is probable that the sectional meeting will continue for one more day, closing on June 11, after which there will be a series of study tours.

Senior engineers from the National Coal Board, which will be 10 years old on January 1, 1957, were invited to give a paper on "Post-War Developments in the Coal Mining Industry" to the Institution of Civil Engineers on December 18. They were Mr. H. A. Longden, director general of production; Mr. B. L. Metcalf, chief engineer to the board; and the board's chief civil engineer, Mr. A. Young.

The 10th Western Metal Exposition will be held at Los Angeles, California, from March 25-29 next year. It will include technical sessions by the American Society for Metals, Los Angeles Section of the American Welding Society, Society for Non-Destructive Testing, and the American Institute of Mining and Metallurgical Engineers. A titanium conference will also be sponsored by A.S.M.'s Metals Engineering Institute.

The annual dinner of the South Wales Institute of Engineers will be held at the Park Hotel, Cardiff, on January 17, 1957.

The summer meeting, 1957, of the Institution of Mining Engineers will be held in Newcastle upon Tyne on July 24, 25 and 26, 1957.

Operators of concentrating mills treating metallic ores, together with the process employed, are listed in "Milling Plants in Canada," Part 17, prepared by the Mineral Resources Division of the Department of Mines and Technical surveys, Ottawa.

As from January 1, 1957, the name of the Moxey Conveyor and Transporter Co. Ltd. will be changed to Moxey Ltd.

Technical Briefs

Upgrading Manganese Ores

Emulsion flotation, a recent development in ore treatment which requires as much as 200 lb. of soap-oil emulsion per ton of ore, has been highly successful in upgrading manganese ores at the Henderson, Nev., plant of Manganese, Inc., United States.

Emulsion flotation, a process somewhat similar to the widely-used froth flotation, differs from the latter in the following primary respects. Use of the emulsion flotation process requires a heavy expenditure of power in conditioning the mineral pulp prior to the flotation stage, and the manner of power application directly affects metallurgical results.

Experiments at Henderson indicate that the highest efficiency in terms of metallurgy results when moderate-intensity conditioning is followed by finishing conditioning at a relatively higher intensity, he declared.

Small-scale laboratory tests have been undertaken in which a high percentage of manganese was recovered from samples of low-grade ores. Manganese specimens from the Maple Mountain-Hovey Mountain deposit, the ores of which do not respond to conventional mineral-dressing techniques or common chemical-extraction methods, were used in the tests which involved chloridizing finely ground ore in a fluidized bed by contact with hydrogen chloride gas.

The results were declared gratifying in the small-scale preliminary tests. For comparison, the less satisfactory results obtained in earlier chloridization tests with a fixed bed of ore also are presented.

The Aroostook County deposits form one of the most important manganese reserves in the United States. Testing the fluidized-bed chloridization technique on a larger scale is recommended to determine whether it can be adapted to permit continuous feeding of ore and withdrawal of concentrate.

ULTRA-THIN COPPER TAPE

Copper tape is now available for the first time in thicknesses as low as 0.00015-inch in pilot lot quantities from the American Silver Company. Last spring the company announced the first successful production, on a commercial scale, of copper tape in thicknesses as low as 0.00025-inch.

The new tape has been developed to meet requirements of the Air Force-sponsored water-type coils, in which the tape replaces bulkier, heavier, wire formerly employed. Typical uses include transformers, solenoids, relays and other applications where space and weight are important.

NEW BRITISH TIN ALLOY

Successful experiments in Britain to develop a new bearing metal to carry the heavier loads demanded by modern diesel and similar engines were described

by Dr. E. S. Hedges, director of the International Tin Research Council, at the third German Tin Conference in Dusseldorf.

Although Babbitt's tin-rich alloy has previously proved satisfactory for bearings, in the last 25 years the considerably greater loads to which bearing surfaces are subjected in some kinds of machinery put more strain on the Babbitt alloys than they are able to endure.

A new bearing metal was sought and the aim was, by combining softness with fatigue strength, to make an alloy of tin which could be used with an unhardened shaft under a heavy load.

In experiments at the Tin Research Institute with aluminium-tin alloys, the addition of a small amount of copper was found to improve the alloy's fatigue strength. Laboratory tests on alloys containing 20 to 30 per cent tin and 1 per cent copper showed that these were a substantial improvement over the Babbitt alloy.

ORE PROCESSING TESTS

A pair of four-foot diameter fluid bed reactors suitable for ore roasting on a tonnage basis has been installed at the pilot plant laboratory of the Battelle Institute, Columbus, United States. The two reactors can roast ores in one or two stages in either oxidizing or reducing atmospheres. They accept either solid or slurry feed.

The new units are believed to be the largest roasters of their kind available for research on behalf of industry and government. The roasters will be used in flexible pilot plant-scale experimentation preparatory to the actual design of full scale ore treatment plants. The units are equipped with instruments for measuring and controlling temperature, pressure, gas flow, and gas composition.

COPPER-CORED NICKEL TUBING

By using copper-cored nickel tubing instead of solid nickel rod, the Jeffrey Manufacturing Company, United States, now gets 40 per cent more current carrying capacity in electrical conductors between sections of its motor starting resistance units.

At the same time, the nickel-clad conductors resist, to a greater extent than bare copper conductors, the oxidation and corrosion from acid and mineral bearing mine waters.

The motor starting resistances are used by Jeffrey in its mine locomotives and in its Colmol continuous miners. The superior conductivity of nickel-clad copper rods permits use of smaller diameter rod to save space and results in cooler operation than is possible with solid nickel rods.

The nickel sheath is responsible for the excellent protection against severe

oxidation and corrosion conditions present in mines.

The corrosive conditions vary considerably from mine-to-mine, but Jeffrey engineers point out that in some mines a copper conductor will be corroded or eaten through so badly that it will fail physically or electrically within several months. The same corrosives have little effect on the nickel cladding.

Jeffrey has tried other materials for conductors between its CSS resistance units, the best, prior to copper-core nickel tubing, being solid nickel rod. Solid nickel had the required corrosion and oxidation resistance but was not completely satisfactory because of its comparatively high electrical resistance.

LOW-GRADE U.S. CHROMITES

Chromite from low-grade domestic deposits, such as those in Oregon and Montana, can be treated to yield satisfactory alloying material for steel-making, it is reported from the United States.

A technical report released by the Department of the Interior describes tests in which various chrome-based alloying metals were produced by electric smelting. Steel companies to which samples of these were sent used them in regular production runs and reported them satisfactory.

In some of the Albany tests, ferro-chrome-silicon-manganese was made, with the manganese added by including offgrade siliceous manganese ore in the electric/furnace charge.

Industry probably will prefer higher-grade chromium-based alloying materials, obtained principally from abroad, as long as enough of them can be obtained at acceptable prices. If imports should be cut off or sharply reduced, alloying metals made from low-grade domestic materials by the new process could be used commercially with only minor changes.

PROTECTIVE COATING

American Nickeloid Co. has developed a new baked synthetic protective coating containing a thermosetting resin, for nickeloid pre-finished metals in copper and brass finishes. The film is baked and cured with intense heat, resulting in a tough, adherent, elastic coating which is claimed to provide gloss, flexibility, chemical and abrasion resistance.

Metals coated with the new film can be drawn, press formed, stamped, roll formed and sealed with no peeling, cracking or flaking of the protective film, the company asserts. These coated metals are being used for door hardware, light fixtures, housewares and other functional and decorative purposes where a protected copper or brass finish is desired.

Metals and Minerals

Expansion of the U.S. Titanium Industry

Industrial production of titanium mill products in the U.S. was nearly three times higher than in 1955, according to Mr. T. W. Lippert, Sales Manager of the Titanium Metal Corporation of America. Output of finished titanium mill shapes in 1956 is expected to total 5,300 tons against 1,900 tons in 1955. About 11,500 tons are scheduled for delivery in 1957.

Production of sponge titanium rose to 14,500 tons in 1956 from 8,000 tons in 1955. Estimates for 1957 production range between 25,000 tons and 28,000 tons—almost double the 1956 rate of output.

The U.S. Commerce Department has been advised that the expanding titanium industry will be able to meet anticipated increased requirements of defence contractors in 1957 and in succeeding years. This statement was made following a meeting at Washington between members of the Titanium Producers' and Fabricators' Industry Advisory Committee, the Business and Defence Services Administration, and other Government agencies. The committee estimates that at the end of 1957 titanium melting capacity will be sufficient to produce ingots at a rate necessary to meet requirements, and that the equipment currently used for fabrication can take care of the needs of defence contractors. However, the Commerce Department also revealed that difficulties were being encountered in scheduling deliveries of fabricated products to the aircraft industry.

Following recent cuts in the price of sponge, Titanium Metals Corporation of America has announced price reductions of 6 to 8 per cent. for fabricated titanium mill products. The company indicated that its action would effect a \$3,000,000 saving for its customers. The cut is the second this year and the fifth since February, 1954. The prices now range from about \$18 to \$22 a lb. for sheet, strip, bar and billets, and certain sizes of wire. The reductions are attributed to cost improvements achieved by volume production of mill products, increased technological advances in vacuum melting, utilization of scrap and continuous rolling.

It has been announced that Allied Chemical and Dye Corporation and Kennecott Copper Corporation plan a jointly owned company to produce and sell titanium. The concern, which will be owned equally by the parent companies, will have an initial investment of \$40,000,000. It will use a new continuous process based on sodium, which is expected to be more economical than other existing methods. Allied Chemical and Dye Corporation also claims to have developed an improved method of making tetrachloride from slag.

Of great potential importance to the future of the titanium industry is the decision of Mallory-Sharon Titanium Corporation to build a large pilot-scale plant at Niles, Ohio, to evaluate a new electrolytic process for recovering pure titanium from scrap metal. Under present procedures, titanium scrap must

be sorted into grades, then handled carefully to avoid contamination from various gases that impair the quality of the refined metal. The process has already yielded several hundred pounds of ductile titanium in a laboratory operation.

The Titanium Metals Corporation of America—the world's largest producer of titanium metal—is to purchase a steel mill at Toronto, Ohio, and convert it into the first specialised and exclusive facility for rolling and forging titanium. Hitherto, the titanium industry has used steel mills to convert titanium ingot into mill products. Titanium Metals will spend about \$8,000,000 for the installation of special rolling mills, special vacuum-annealing furnaces of its own design and heat-treating equipment, at the Toronto plant. First items from the new facility will be special forged billets for jet engines, wheels and heat-treated alloy sheet for advanced jet fighters, bombers and ballistic missiles.

At a symposium held recently at Wilmington, Mr. Lee S. Busch, director of research of Mallory-Sharon Titanium Corporation, said the fabricating technology had now reached the stage where titanium with reliable characteristics was available. The symposium was sponsored by E. I. du Pont de Nemours. Its main theme was the non-defence potentialities for titanium.

For the first time in automotive history, titanium has been used on a direct and large scale in General Motors' experimental "family car of the future", the "Firebrand II". The new car has an all-titanium body, for which wide titanium sheets were specially produced by Republic Steel Corporation at its Ohio titanium plant.

Two Japanese producers, the Toho Titanium Co. and the Osaka Titanium Co., are negotiating with the U.S. Commodity Credit Corporation to supply the latter with 6,000 tons of titanium sponge under a four-year contract from October, 1957. They have been supplying the Commodity Credit Corporation with titanium sponge at \$3.50 a lb. under a two-year contract ending in September, 1957. Ninety per cent of the Japanese output is sold abroad, mainly in the U.S.

In its search for titanium-bearing ores, the Columbia-Southern Chemical Co. will soon start exploratory operations in Liberia under a concession agreement dated June 27, 1956, between the company and the government of that country.

CONSERVATION OF NICKEL

The scope which exists for the conservation of nickel by utilization of manganese-type stainless steels is indicated by the Department of Defence, Washington, in a report which covers the first three quarters of 1956. During this period a total of 189,000 tons of 301 and 302 stainless steels was produced in the U.S., but production of 201 and 202

(manganese-type) stainless steels amounted to less than 14,000 tons.

Yet, assuming a 90 per cent substitution (as estimated by the Materials Advisory Board staff study of these steels), the further use of 170,000 tons of manganese stainless steels would have been possible. This would have conserved 8,500 tons of nickel and saved consumers some \$6,800,000 in direct cost reduction, because of the lower cost of manganese-type steels.

About one-third of all nickel goes to direct military and atomic energy uses. All military departments have told their designers to seek out ways to replace high-nickel stainless steels in their equipment with the new manganese-type alloys, or with aluminium, plastics, or other non-nickel materials.

Conservation of scarce materials is still apt to be regarded as a short-term expedient. In their report, however, the Department of Defence point out that in future years it will not be possible to afford the lush expenditures of minerals which are being made to-day. "As we grow wise, skillful and prudent in our use of these materials," states the department, "it will help us to meet the challenge of future growth and still live within our national resources of minerals."

To what extent is the long-term importance of conservation appreciated by Governments and commercial users in other free world countries?

PLATINUM FUTURES

In the U.S. platinum market the main interest has recently been concentrated on dealings in futures at the New York Mercantile Exchange. It is reported that established refiners and dealers have tended to disparage the new market, expressing doubt that ultimate consumers will find much use for its services, since a constant supply of the metal makes hedging unnecessary. In the first three days of trading values eased. January, for instance, opened, on Monday with sales at \$103.25 and \$103.50, but values declined to \$99.00/102.75 bid-asked.

ZINC IN AMERICAN MOTOR CARS

According to the American Die Casting Institute, automotive engineers in the U.S. have made much wider use of die castings in designing the 1957 cars now on display than in any previous year. It is estimated that approximately 8 per cent more zinc die castings are employed per 1957 car than for 1956 models. Assuming that 6,500,000 cars will be produced in the calendar year 1957, the automotive industry will increase its use of zinc die castings over 1956 by some 40,000 tons. The average usage per car will exceed 65 lb. compared with 60 lb. used on the 1956 models. It is claimed that no competitive non-ferrous materials have equalled or surpassed the growth of zinc on a pounds per car basis. One major car manufacturing company re-

ports that since 1952 its use of zinc die castings has jumped from 32 lb. to 59 lb. per car.

Motor car producers find that zinc die castings provide accurate heavy duty and shock resistant parts at minimum cost consistent with high quality.

Production reports indicate that zinc is being used for such purposes as trim, tail light assemblies, grilles, decorative mouldings, window supports, head light assemblies, and such functional parts as carburettors, wind shield wiper motors, door handles, window cranks, and components for air conditioning systems.

More than 240,000 tons of zinc die castings were used in automotive applications during the industry's peak year, 1955.

CADMIUM IN RHODESIA

Since August Rhodesia Broken Hill has been producing cadmium at the rate of 10 tons monthly. Production is mainly exported to Britain for use in electroplating and in the manufacture of special bearing metals and pigments. The ores mined contain minute quantities of cadmium, which is extracted as a by-product of lead and zinc production by leaching, precipitation, fusion and distillation.

HIGH PURITY MAGNESIUM

The Dow Chemical Co.—sole U.S. producer of primary magnesium—has announced that its high purity magnesium is now available for volume orders. This ranges in purity from 99.8 to more than 99.9 per cent and much of the supply is used in the production of titanium, zirconium, beryllium and uranium. The regular primary grade of about 99.8 per cent purity is adequate for structural applications and all but a few chemical uses. Dow is increasing by ten per cent the combined capacity of its Freeport, Texas, magnesium plant and of the government-owned plant which it operates at nearby Velasco. The combined capacity of the two plants is now about 75,000 tons annually.

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A report from Belgrade states that Yugoslavia may build a magnesium plant on the Adriatic coast. A project for such an installation is under consideration.

U.S. URANIUM MILLS

The Atomic Energy Commission has stated that the leading mill processing uranium ore into concentrates is that of the Anaconda Co. at Bluewater, N.M., which is rated at 3,000 tons of ore per day. This unit and 11 others have a capacity of nearly 9,000 tons of ore a day. All except one are privately owned and operated. Investment in these mills is more than \$50,000,000. In addition, the commission has negotiated contracts for eight new mills with a total capacity of more than 4,000 tons of ore a day. These are scheduled for completion next year or early in 1958. Private investment in them is in the region of \$35,000,000. Proposals involving the building of several additional plants have also been received.

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The Colonial Secretary, Mr. Lennox-Boyd, stated recently in a Parliamentary answer that special surveys in 11 colonial

territories had not as yet disclosed any major deposits of uranium capable of economic working. He added that thorium was being mined in Nigeria and Malaya.

UNIQUE CORUNDUM MINE

Corundum is now being exported at the rate of 500 tons a month from workings at Concession, 40 miles from Salisbury, S. Rhodesia, to South Africa and the U.S.. The world's biggest blast furnace, now being brought into operation at Scunthorpe, Lincolnshire, is lined with bricks made in South Africa from Rhodesian corundum which very considerably extend the life of furnace linings. The existence of corundum in a hill near Concession has been known for several decades, but it is only within the past five years that a use has been found for the mineral sufficiently important to justify exploitation. The mine is owned by a South African firm which bakes the ore, crushes it, and then processes it into refractory bricks. The ore brings about £8 a ton and a shipment is now being prepared for the United States, where experiments will be made to see whether the mineral has any other applications. It is estimated that the present reef contains about 250,000 tons of corundum, and efforts are going ahead to prove further reserves which undoubtedly exist. Holes to take explosive charges are melted instead of drilled out of the rock face. This melting process, which made large-scale blasting of the corundum reef possible, was developed from flame-drilling techniques used in the United States of America.

TURKISH MINERALS

The Turkish Ministry of Commerce has issued a memorandum to exporters of chrome and manganese on the use of the earnings from their exports to finance imports of machinery spares and other essential items. The Eti-Bank will handle exports of both these ores and will see that the proceeds of the deals are transferred to special accounts at the Turkish Central Bank. The Ministry of Commerce, however, will have the final say on the use of foreign currency.

LITHIUM IN CANADA

The Manitoba department of industry and commerce states that recent technical progress in Canada may soon result in the development of more than 12,000,000 known tons of lithium ore in south-eastern Manitoba. The deposits were first discovered in the 1930's, but inaccessibility and inadequate knowledge of leaching the mineral from the ore made it commercially worthless at the time. One of the three companies which have taken up claims in the area has already spent more than \$1,000,000 on development and company officials state that

\$5,000,000 will be spent before the mine goes into commercial production in the autumn of 1957.

ZIRCONIUM REFINING

Development work on a new process for refining zirconium is being undertaken at the Boulder City station of the U.S. Bureau of Mines. Electro-refining techniques, similar to those used in refining titanium, are employed. Besides enabling more zirconium metal to be produced, the electro-refining method would allow material now lost in producing, fabricating and machining zirconium to be recovered.

FURTHER U.K. GOVERNMENT COPPER OFFER

The Board of Trade will shortly offer about 4,800 tons of copper for sale by open tender. The main item is 3,300 tons of cathodes and the remainder consists of horizontal wire bars, billets and vertically cast wire bars. This metal forms part of the 36,000 tons offered for sale last October, and consists mainly of cathodes which remained unsold on that occasion. It will be offered for delivery and pricing evenly over the three months February to April, 1957.

In October 18,000 tons of copper were put up for sale by open tender and a further 18,000 tons were scheduled to be sold back to original suppliers.

Part of the copper now offered for open tender consists of copper which had been originally scheduled for return to companies which had supplied the stockpile in its early days.

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The labour dispute at the Chuquimata copper mine has been settled. A new agreement signed by representatives of the company and the workers gives the workpeople wage increases and other benefits totalling 1,600,000,000 pesos annually. The original offer was 1,100,000,000 pesos and the original workers demands more than 2,000,000,000. The agreement is valid for 15 months from January 1, 1957.

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Copper production for the first 11 months of this year by three big American-owned companies in Chile—Chile Exploration, Andes Copper and Braden—was 402,944 metric tons. December production is estimated at 36,631 tons, which would bring the total for the year to 439,575 tons, almost 50,000 tons more than last year.

Meanwhile U.S. domestic deliveries of copper were 114,524 tons in November against 113,353 tons in October. Stocks rose on the month by 10,000 tons to 116,516 tons. Producers' deliveries to copper consumers outside the United States in November reached 125,902 tons, the highest for any month this year.

As the Markets were closed over the Christmas holidays our regular features—The London Metal Market, London Metal and Ore Prices and London Stock Exchange Prices—are not appearing this week. They will be resumed in our next issue.

Mining Finance**Tronoh-Malayan Group's Expansion**

Neither apprehension regarding the future political development of Malaya, nor doubts that the supply/demand position for tin will remain favourable, are being allowed to shake the Tronoh-Malayan Group's confidence in the future of the tin mining industry. In the words of Mr. Rich to shareholders of Tronoh Mines—quoted by Mr. G. W. Simms in his statement to shareholders of the Sungai Besi Mines—"There is no justification for changing the long established policy of continuing and expanding our operations in Malaya by improving the efficiency of existing installations and by equipping new areas".

This statement well expresses the Group's policy towards its operations in Malaya, and any anxieties that appear to exist would seem to be concerned with expanding production to meet future world demand for tin rather than with worrying about problems of oversupply. Indeed, Mr. E. V. Pearce, chairman of Malayan Tin Dredging and Southern Malayan Tin Dredging, believes that within a very few years the world will need every ton of tin that can be produced.

The Tronoh-Malayan Group intends to push ahead as rapidly as possible therefore with projects for exploring new areas for future production. It is well aware of the fact that production by the dredging section of the Malayan tin industry cannot fail ere long to fall substantially unless new areas can be found to replace reserves now rapidly becoming exhausted. One of the post-war difficulties in this respect has been the government reluctance to issue boring permits and to alienate land for mining. But there are signs that this attitude may be improving.

From the latest annual reviews of four of the Tronoh-Malayan tin companies published in last week's issue it is clear that the Group fully intends to back its confidence in the future of the Malayan tin industry. In the case of Malayan Tin Dredging, a new dredge is to be installed to commence operations by the end of 1958 or early 1959 and will cost between £800,000 and £850,000. At Southern Malayan Tin Dredging—the offspring of the former company which holds a large part of its capital—a sum in the region of £1,000,000 is to be spent on equipping an undeveloped section of the company's property and for other purposes. The Sungai Besi mines envisage a capital expenditure of about £100,000 while at Ayer Hitam Tin Dredging considerable expense has already been incurred on dismantling a dredge previously situated at Harrietville, in Australia, for re-erection on the company's property in Malaya. As Ayer Hitam was previously dependent on one dredge, the property's conversion into a two-dredge operation has enhanced its outlook for the future.

Much criticism has recently been levelled against Malayan tin companies for having built up large financial resources which were not being put to work in the industry, and certainly this, in some

instances, appeared justified. The Tronoh-Malayan Group's progressive policy will, therefore, do much to demonstrate the wisdom of husbanding resources to finance the cost of expansion and exploration.

S.A. URANIUM SECRECY RELAXED

The South African Minister for Mines has announced that South African uranium producers may, in future, disclose information concerning ore reserves, grade and details of production since July 1, 1955. Statistics regarding operations prior to this date, together with prices payable to the mines concerned, have not yet been declassified.

For some time South Africa has been criticized for not permitting the publication of information regarding uranium production in the same way as companies operating in the United States and in Canada. The latest statement does much to bring the Union into line with other countries, but the withholding of the data as to the prices received and working costs, if persisted with still means that the crucial items for investment calculations are not available.

Nevertheless it will be possible, from the information due to be made public, for investors to arrive at a better assessment of the value of their gold/uranium shares. In the first place, some idea of potential profits to be earned by new producers such as Buffelsfontein and Hartebeestfontein during the 10 year period of contract with the Atomic Energy Board may be obtained.

Secondly, and probably more important, it should be possible to judge the viability, when A.E.C. contracts expire, of those large low grade gold mines whose revenue is now almost entirely from uranium production. The two outstanding examples which spring to mind in this respect are Randfontein and West Rand Consolidated. The question has been asked whether these properties will be able to return to economic gold production in the event of lower uranium prices when contracts end, and commercial competition for the sale of uranium may have to be faced. Apart from anything else, a big problem would be the availability of sufficient labour to permit of a large enough scale of operations. If, however, the information due to be disclosed shows that these mines possess relatively high-grade uranium-bearing ores, their future prospects will obviously be regarded more favourably than they are at present.

One property which does not fall into either of these categories is Klerksdorp Consolidated which, not being admitted into the South African uranium scheme, will in all probability have to arrange its own finance. Naturally, if private investors are to be asked to put up the money for such a venture, they would have to be given some idea of profit and life expectations.

MR. S. G. MENELL ON RIEBEECK

In discussing the problem of capital famine for development in South Africa at the recent meeting of Anglo-Transvaal Consolidated Investment Company, Mr. S. G. Menell made an interesting reference to the recent flotation of Riebeeck Gold Mines on a disturbed gold share market. If this issue had not to be made at so unpropitious a moment things might have gone a good deal better than they did. Yet development obviously cannot be held up indefinitely while a market turn is awaited. And as Mr. Menell emphasizes the operation provides yet another example of the faith that the Rand mining finance houses have in the long term prospects of their mining ventures. In this instance, the underwriters were Anglo American, General Mining and Anglo-Vaal.

Speaking specifically about Riebeeck, Mr. Menell disclosed that the twin haulage from No. 2 Shaft of Loraine Gold Mines had by the end of November reached a position approximately 3,700 ft. from the point at which it will enter the Riebeeck property. The object of this haulage is to accelerate development and initially provide a second outlet for the mine.

END OF SCOTTISH AUSTRALIAN ?

Following a forecast last April of The Scottish Australian Mining Company's intention to commence winding up proceedings as soon as the position could be seen clearly. An extraordinary general meeting, at which a proposal to liquidate the company will be submitted, is being held to-day.

A circular to stockholders has explained that advice arrived last September from the company's attorney in Sydney that a contract in respect of the remaining area of the Lambton Freehold Estate had been signed, and the greater proportion of the relative purchase consideration duly received. This receipt, together with others in hand, enabled a further distribution to stockholders on October 31 at the rate of 2s. 6d. per 4s. unit of stock.

The circular goes on to inform stockholders that, together with the company's investments in Commonwealth government and commercial securities, the proceeds of recent sales should ultimately result in total further distributions of about 6s. 6d. per 4s. unit of stock subject to the expenses of liquidation.

It is recorded with satisfaction that surpluses realized on the sale of capital assets (predominantly the Lambton Freehold Estate) and distribution to stockholders since 1945, amount, together with surpluses which it is now estimated will be realized, to 13s. 8d. per 4s. unit of stock. Additionally, surpluses amounting to 2s. per unit were realized and taken into account during the ten-year period to 1945.

Financial News and Results

Tanks' Improved Profits.—The consolidated balance sheet of Tanganyika Concessions at July 31, 1956, showed a net liquid asset position of about £1,500,000. The company's holding in Union Minière du Haut Katanga recorded in the balance sheet at £4,338,513 had a market valuation of £75,499,200 compared with £85,386,000 previously. Holdings in the Benguela Railway Company, the accounts of which are not consolidated, were accorded a book value of £4,632,670 against £4,733,990. Tanks' consolidated profit and loss account for the past financial year showed profits, after taxation, greatly improved to £3,982,642 from £3,000,830. Dividends absorbed £3,595,841 (£2,829,558) and the profit unappropriated rose to £2,290,533 from £1,903,290.

Production at Chenderiang.—Owing to the development of a new paddock at its Sungei Lah Section, Chenderiang Tin Dredging's output during the first six months of the current financial year ending March 31, 1957, declined to 101½ tons from 110½ tons during the previous corresponding period. Estimated mine profit up to the end of October, including income from tribute, amounted to £13,000.

During the past financial year Chenderiang treated 407,500 cubic yards (554,400 cubic yards) for a recovery of 220.31 tons of tin ore (200.91 tons). This represented the exceptionally high grade of 1.21 lb. per cubic yard against the previous year's figure of .81 lb. A price of £444 (£409) was received for ore sales, but costs per cubic yard rose to 38.08d. from 27.16d. The company's net profits after tax of £23,062 (£12,519) rose to £17,402 from £15,530 and dividends absorbed £11,500 (£8,500). Chenderiang's balance sheet at March 31 showed net liquid assets of about £65,000, a figure which will since have been reduced by the payment of £15,000 towards the tin control buffer stock. A return of capital amounting to 5s. per £1 unit will also absorb a further sizeable sum.

Frontino Board Changes.—Following the successful outcome of the offer by the South American Gold and Platinum Company for the exchange of debentures in that company for shares/stock in the Frontino company, the following changes in the Directorate are advised:—**Resignations:** The Rt. Hon. Lord Rathcavan, P.C. (Chairman); The Rt. Hon. Lord Remnant, M.B.E.; The Rt. Hon. Lord Cochrane of Culter, D.S.O.; Mr. A. R. O. Williams, O.B.E.; Mr. A. E. Gilbert (Managing Director and Secretary). **Appointments:** Mr. P. H. O'Neill (alternate Mr. V. E. Skinner); Mr. M. K. Whitehead (alternate Mr. P. Brackfield); Mr. W. Breeding; Mr. H. F. Brownbill; Mr. V. E. Skinner (Secretary). Mr. L. B. Harder, who will be Chairman (alternate Director Mr. F. A. Mann).

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LAKE VIEW AND STAR

The Forty-sixth Annual General Meeting of Lake View and Star Limited was held on December 20, 1956, in London.

Sir Joseph Ball, K.B.E. (the Chairman), in the course of his speech, said:—

There was a slight overall decrease in the working profit, as compared with that for the previous year. The amount available for appropriation from mining operations this year was £444,166, as against £447,454 last year.

£235,500 has been provided for U.K. taxation on the year's profits, compared with £246,000 last year. As a result of additions to plant and machinery during the year, the provision for depreciation has risen to £41,256.

The interim dividend of 9d. per share which was paid during the year, absorbed £60,375 net. The Directors now recommend the payment of a final dividend of 1s. 3d. per share, absorbing a net amount of £100,625.

In view of the large sum expended on capital equipment the Board considered it desirable to transfer to General Reserve the sum of £100,000. The balance left to be carried forward has thus been reduced to £2,109, as compared with £54,094 carried forward at June 30, 1955.

Total development footage for the year at 28,163 feet showed an increase of 305 feet over the figure for the preceding year. Of 17,332 feet advanced on lodes, 10,173 feet, or 58.7 per cent, averaged 5.4 dwt. per ton over a width of 56 ins.

Ore reserves at July 1, 1956, amounted to 3,668,000 short tons at 4.77 dwt. per ton, a decrease in tonnage of 46,000, but an increase in grade of 0.01 dwt. Positive and broken ore totalled 3,339,700 tons averaging 4.70 dwt. per ton, or 91.0 per cent of the total ore in reserve.

Milling

Tonnage milled during the year was 740,518 tons (an increase of 8,909 tons) averaging 4.71 dwt. The recovery which had been improved last year to 91.28 per cent fell to 90.25%.

In Australian currency, the cost per ton of ore treated progressively declined from 52/11 in 1952/53 to 51/11 in 1954/55; and during the year 1955/56 there has been a further slight reduction of 51/10.

During the four-year period of reduced costs to which I have referred, basic wage rates in Australian currency have been increased by 28s./8d. per week, and in addition in April, 1955, increases of about 30s. per week were granted in the margins enjoyed by skilled employees in the industry.

Since the close of the year under review, there has already been a further increase of 6s./9d. in the basic wage; which in the Gold-Fields area now amounts to £A13 2s. 8d. per week.

During the past four years, there has also been a persistent rise in the cost of practically every item of stores and equipment used on a mine, and a substantial increase in freight charges.

In the face of all these handicaps costs have been reduced only by constant improvements in efficiency, which have resulted from a combination of first-class management on the spot and judicious capital expenditure.

Capital expenditure during the past four years has amounted to approximately £237,000, the greater part of which has been incurred with the object of reducing costs.

To cope successfully with the ever-in-

creasing cost of producing gold in Australia, it will be necessary for us to incur further heavy capital expenditure during the next few years. The Australian Government, for the purpose of encouraging gold production, has freed altogether from Australian taxation, the profits derived from gold mining. In the case of companies such as Lake View and Star, however, which, although operating in Australia, are registered in this country, this concession by the Australian Government has been frustrated by the incidence of the U.K. tax system.

In June last, the Chancellor of the Exchequer undertook to consider introducing legislation in 1957 to deal with this matter.

Since the Chancellor's intended concessions were announced however, the financial situation of the U.K. has undoubtedly deteriorated, and considerations regarding the budgetary and balance of payments positions may well rule out the introduction of substantial taxation reliefs in the next Budget.

Your Directors therefore have decided not to wait for whatever budgetary relief the Chancellor may find it possible to make in April next, but, instead, to prepare an application for the transfer of the domicile of the Company to Australia.

It is only by continued capital expenditure that the battle against rising costs can be won. Hitherto, it has been possible to finance such expenditure out of the Company's existing resources. It would still be possible to do so, were the Company to be relieved of the burden of U.K. taxation; and, in these circumstances, I feel satisfied that a reasonable case can now be made out for the consideration of the Treasury.

The report and accounts were adopted.

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*This feature appears every
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KENTAN GOLD AREAS LIMITED

PLANT RECONSTRUCTION PROGRAMME

MR. M. T. W. EASBY'S STATEMENT

A General Meeting of Kentan Gold Areas Limited was held in London on December 20.

Mr. M. T. W. Easby, Managing Director, presiding in the absence of the Rt. Hon. Earl Grey, said: Operations at Geita during the year under review have been severely handicapped by power failures and mechanical faults in the reduction plant. These failures are referred to by New Consolidated Gold Fields Limited, the Technical Advisers to the Geita Company, in their report which is attached to the accounts. The reconstruction programme which was decided upon as a means of overcoming these difficulties has been under way now since April, 1956, when the total cost of the programme was estimated at £175,000.

The funds for this programme are being provided jointly by your Company and New Consolidated Gold Fields Limited on loan at 6 per cent. per annum. New Consolidated Gold Fields having an option to increase their share in the equity capital of the Geita Company from 20 per cent. to 33 per cent.

Satisfactory Development

While all these difficulties have been encountered on the surface, development underground during the year at the North East Extension has proceeded satisfactorily and the Company has been able to include in the ore reserve at June 30, 1956, a sizable tonnage of ore fully blocked out in that area. As the Tech-

nical Advisers state, it is encouraging to note that only one-fifth of the potential strike indicated by surface trenching has so far been developed in this area, and the higher grade for this block augurs well for the future.

However, since the end of the year under review, operating losses have been sustained in the September Quarter totalling £23,180, which naturally give rise to concern.

Loan Facilities

Meanwhile, your Company and New Consolidated Gold Fields Limited have agreed to provide further loan facilities equally up to an amount of £100,000 at 6% per annum, secured on the assets of the Geita Gold Mining Company Limited. It is hoped that these facilities will be sufficient to complete the reconstruction programme.

The Consulting Engineer, London, has just spent a fortnight at the mine. As a result, further reorganization of senior staff has been found necessary and has been carried out.

The reconstruction work in the crushing and milling plant is going on well. The lack of power is still a matter of great concern and the next few months are likely to be critical. During this period the results from the mine are not expected to be encouraging but operations are under the closest review.

The Report and Accounts were adopted.

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AUTHORIZED AND ISSUED CAPITAL
£385,000 in 385,000 Shares of £1 each

Working Profit	£387,619	
Add Sundry Revenue less Expenses	249	
	387,868	
Taxation	99,915	
Profit after Taxation	287,953	
Balance unappropriated	156,100	
		£444,053
Expenditure on Mining Assets and Trade Investments	12,390	
Dividends declared:—No. 99 of 3s. 6d. per share and No. 100 of 3s. 6d. per share	125,125	
		137,515
Balance unappropriated at August 31, 1956		£306,538

The coal despatched from the mine amounted to 1,746,955 tons, a decrease of 15,682 tons compared with the total for the previous year. Output in the Wolwekrans Section was adversely affected in part due to a serious shortage of Native labour and in part to a shortage of railway trucks. As the labour shortage has continued for some time, investigations are being made into the question of the better utilization of the reduced available force by the substitution of modern conveyor equipment for certain existing haulage arrangements.

Southern Section.—Two producing districts operated throughout the year, and a third district was opened in July and August, 1956, to meet a temporary increase in demand. For the remainder of the year, production was restricted to about 20,000 tons per month, as in previous years.

It is estimated that capital expenditure will be incurred during the financial year ending the 31st August, 1957, mainly on the permanent duff-dewatering plant, roads, change house and other facilities, amounting to £42,000. In addition, the scheme for modernizing the main haulages, which has recently been authorized by the Board, will involve expenditure of the order of £170,000, the major portion of which will probably be incurred during the current financial year. It is proposed to finance this expenditure out of the Company's cash resources.

The full Report and Accounts may be obtained from the London Secretaries, A. MOIR & CO., 4, London Wall Buildings, London, E.C.2.

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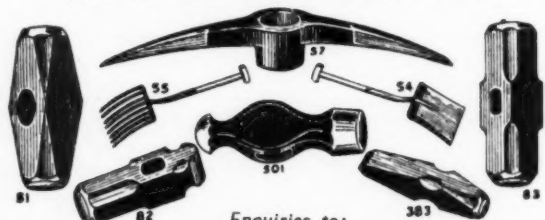
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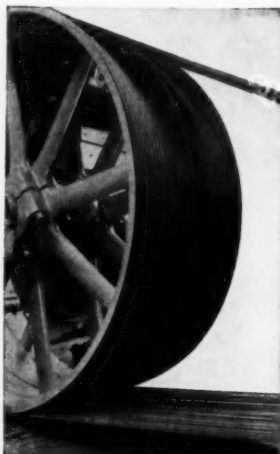


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